



Translation

## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

28 FEB 2005

Applicant's or agent's file reference <b>P04582800</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/JP2003/011114</b>	International filing date ( <i>day/month/year</i> ) <b>29 August 2003 (29.08.2003)</b>	Priority date ( <i>day/month/year</i> ) <b>30 August 2002 (30.08.2002)</b>
International Patent Classification (IPC) or national classification and IPC <b>G01M 13/04, 19/00, 17/08, F16C 41/00, B61F 15/20, G01D 21/00, G01B 21/00</b>		
Applicant <b>NSK LTD.</b>		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of _____ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the report</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>
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Date of submission of the demand <b>17 March 2004 (17.03.2004)</b>	Date of completion of this report <b>01 October 2004 (01.10.2004)</b>
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2003/011114

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

This report is based on translations from the original language into the following language \_\_\_\_\_, which is language of a translation furnished for the purpose of:

- international search (under Rules 12.3 and 23.1(b))
- publication of the international application (under Rule 12.4)
- international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

The international application as originally filed/furnished

the description:

pages \_\_\_\_\_, as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the claims:

pages \_\_\_\_\_, as originally filed/furnished

pages\* \_\_\_\_\_, as amended (together with any statement) under Article 19

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the drawings:

pages \_\_\_\_\_, as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

- the description, pages \_\_\_\_\_
- the claims, Nos. \_\_\_\_\_
- the drawings, sheets/figs \_\_\_\_\_
- the sequence listing (*specify*): \_\_\_\_\_
- any table(s) related to sequence listing (*specify*): \_\_\_\_\_

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages \_\_\_\_\_
- the claims, Nos. \_\_\_\_\_
- the drawings, sheets/figs \_\_\_\_\_
- the sequence listing (*specify*): \_\_\_\_\_
- any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

**Box No. IV Lack of unity of invention**

1.  In response to the invitation to restrict or pay additional fees the applicant has:
  - restricted the claims.
  - paid additional fees.
  - paid additional fees under protest.
  - neither restricted nor paid additional fees.
2.  This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1,  
not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- complied with.
- not complied with for the following reasons:

The subject matters of claims 1-37 relate to abnormality-diagnosing devices for mechanical equipment of railroad trains.

The subject matters of claims 38-48 relate to methods and devices for monitoring the status of mechanical equipment.

The subject matters of claims 49-52 relate to abnormality-diagnosing devices for mechanical equipment.

The subject matters of claims 53-60 relate to bearings having a means of detecting abnormality in mechanical equipment.

The International Preliminary Examining Authority finds that each of the above-mentioned four groups of claims satisfies the requirement of unity of invention separately.

4. Consequently, this report has been established in respect of the following parts of the international application:

all parts.

the parts relating to claims Nos. \_\_\_\_\_

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP03/11114

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims	1-23, 25-37, 43-52, 57-60	YES
	Claims	24, 38-42, 53-56	NO
Inventive step (IS)	Claims		YES
	Claims	1-60	NO
Industrial applicability (IA)	Claims	1-60	YES
	Claims		NO

**2. Citations and explanations (Rule 70.7)**

- Document 1: JP, 2002-71519, A (NTN Corp.), 8 March, 2002 (08.03.02)  
 Document 2: JP, 2001-21453, A (NSK Ltd.), 26 January, 2001 (26.01.01)  
 Document 3: JP, 7-209143, A (Caterpillar Inc.), 11 August, 1995 (11.08.95)  
 Document 4: JP, 6-200929, A (AB SKF), 19 July, 1994 (19.07.94)  
 Document 5: WO, 98-11356, A1 (The Timken Co.), 19 March, 1998 (19.03.98)  
 Document 6: JP, 47-9446, A (General Electric Co.), 15 May, 1972 (15.05.72)  
 Document 7: JP, 3-152436, A (Koyo Seiko Co., Ltd.), 28 June, 1991 (28.06.91)  
 Document 8: JP, 2-240536, A (Fuji Electric Co., Ltd.), 25 September, 1990 (25.09.90)  
 Document 9: JP, 6-42983, A (Omron Corp.), 18 February, 1994 (18.02.94)  
 Document 10: JP, 2000-133474, A (Asahi National Shomei K.K.), 12 May, 2000 (12.05.00)

The subject matter of claim 24 is described in document 2 (paragraphs 0041 and 0008) cited in the ISR, and so does not appear to be novel or to involve an inventive step.

The subject matters of claims 38-42 are described in document 1 (paragraphs 0001, 0014 and 0023-0070) cited in the ISR, and so do not appear to be novel or to involve an inventive step.

The subject matters of claims 53-56 are described in document 5 (full text, Figs. 1-3, 9 and 10, and signs 46, 48 and 50) cited in the ISR, and so do not appear to be novel or to involve an inventive step.

The subject matters of claims 1-3, 15, 16 and 18-21 do not appear to involve an inventive step in view of document 1, document 2 (paragraphs 0008 and 0012-0046, and all drawings) and document 3 (paragraphs 0006, 0014 and all drawings). A person skilled in the art could have easily applied the mechanical-part monitoring system described in document 1 to which the concept of feedback described in document 3 is applied to the train cars described in document 2.

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of: V.2

The subject matters of claims 4 and 5 do not appear to involve an inventive step in view of documents 1-3 and document 4 (paragraphs 0006, 0014, 0015 and 0024, and all drawings) cited in the ISR. A person skilled in the art could have easily applied a temperature analysis part described in document 4 to the apparatuses described in documents 1-3.

The subject matters of claims 6, 17 and 22 do not appear to involve an inventive step in view of documents 1-3 and document 5 (full text and all drawings) cited in the ISR. A person skilled in the art could have easily applied a feature described in document 5 wherein stored data is output to a control processing part by radio or a feature described therein wherein a sensor obtains vibrations from flat spots of wheels, to the apparatuses described in documents 1-3.

The subject matters of claims 7, 9 and 23 do not appear to involve an inventive step in view of documents 1-3 and document 6 (full text and all drawings) cited in the ISR. A person skilled in the art could have easily applied a technology described in document 6 wherein a wave filter is used for diagnosing abnormalities in bearings or gear devices to documents 1-3.

The subject matter of claim 8 does not appear to involve an inventive step in view of documents 1-3 and document 7 (full text and all drawings) cited in the ISR. A person skilled in the art could have easily applied the descriptions of document 7 that relate to a load zone to documents 1-3. The scope of application of the load zone is a matter of design variation that a person skilled in the art could have chosen as required.

The subject matters of claims 10-14 do not appear to involve an inventive step in view of documents 1-3 and document 8 (full text and all drawings) cited in the ISR. A person skilled in the art could have easily applied a feature described in document 8 wherein wear abnormalities of a gear are represented by calculating the ratio of the spectrum components of fundamental waves and harmonic waves, to the apparatuses of documents 1-3.

The subject matter of claim 25 does not appear to involve an inventive step in view of document 2 and document 6 (full text and all drawings) cited in the ISR. A person skilled in the art could have easily applied an amplification means described in document 6 (signs 91 and 93) to the abnormality-diagnosing device of document 2.

The subject matters of claims 26-28 do not appear to involve an inventive step in view of document 2 and document 5 (full text and all drawings). A person skilled in the art could have easily applied a feature described in document 5 wherein the output of a sensor provided in bearings in train cars is transmitted to the cars or a remote processing part on the land, to document 2.

As for the subject matters of claims 29-37, a person skilled in the art could have easily replaced the processing part described in document 1 with the electric processing circuit including a digital micro fuzzy processor, described in document 9 (paragraphs 0019-0024 and all drawings).

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of: V.2

The subject matters of claims 43-46 do not appear to involve an inventive step in view of documents 1 and 9. A person skilled in the art could have easily applied the electric processing circuit including a digital fuzzy microprocessor, described in document 9, to document 1.

The subject matters of claims 47 and 48 do not appear to involve an inventive step in view of documents 1 and 2. Document 2 (paragraph [0008]) shows machine tools and industrial machines, and windmills are in the category of industrial machinery.

The subject matter of claim 49 does not appear to involve an inventive step in view of documents 2 and 5 and document 3. A person skilled in the art could have easily applied the means of securing a sensor unit with bolts, described in document 5 (Figs. 4 and 5, sign 98), and the means of feeding back control signals to a control system, described in document 3, to the abnormality diagnosing device described in document 2.

The subject matter of claim 50 does not appear to involve an inventive step in view of documents 1 and 2. A person skilled in the art could have easily applied the data storage technology described in document 1 (particularly, paragraph 0018) to document 2.

The subject matter of claim 51 does not appear to involve an inventive step in view of documents 2 and 9. A person skilled in the art could have easily replaced the electric processing circuit including a digital fuzzy microprocessor, described in document 9, with the data processing part described in document 2.

The subject matter of claim 52 does not appear to involve an inventive step in view of document 2 and document 1, 5 or 9. A person skilled in the art could have easily replaced the communication technology described in document 1 (paragraph 0028), document 5 (Fig. 7 and explanation for it, particularly, sign 122) or document 9 (paragraphs 0023 and 0035) to document 2.

The subject matter of claim 57 does not appear to involve an inventive step in view of documents 1 and 5. A person skilled in the art could have easily applied the judgment result output part described in document 1 to the bearing described in document 5.

The subject matter of claim 58 does not appear to involve an inventive step in view of documents 5 and 9. A person skilled in the art could have easily identified the calculation/judgment/control by the digital fuzzy microprocessor described in document 9 (paragraph 0021) for an abnormality diagnosing means well-known and commonly used in various apparatuses (for reference, see the examples in documents 1 and 2) and applied it to document 5 (sign 162).

The subject matter of claim 59 does not appear to involve an inventive step in view of documents 5 and 9. A person skilled in the art could have easily applied the sensor for physical quantities described in document 9 for the sensor installing means described in document 5 (Fig. 4, sign C, 100, 98).

The subject matter of claim 60 does not appear to involve an inventive step in view of documents 5 and 2. A person skilled in the art could have easily applied the abnormality diagnosing device having a processing part and an analyzing part, described in document 2 (paragraphs 0012-0046 and all drawings), to document 5.